IRA BCT Scoping Meeting Summary

Date of Call: 10/07/2020
Time of Call: 1400 EST
Meeting Leader: Paula Bond, Aerostar SES LLC (ASL)
Attendees:

Name	Organization
Dave Gibson	AFCEC BEC
Paula Bond	ASL Project Manager
Jim Romer	ASL Project Engineer
Cheryl Brewer	ASL Project Technical Support
Lee Major	CN-AFCEC Support Contractor
Mark Weegar	CN-AFCEC Support Contractor
Dave Kline	EGLE RRD Section Manager
John Bradley	EGLE RRD Supervisor
Brad Ermisch	EGLE Compliance and Enforcement
Eric Wildfang	EGLE Toxicologist Supervisor
Beth Place	EGLE RRD Project Manager
Matt Baltusis	EGLE Geologist
Doran Bogdan	AECOM - EGLE Contractor
Divinia Ries	EGLE Toxicologist
Jeremiah Morse	AECOM - EGLE Contractor
James Gatherer	ASL Modeler
Andrea Keatley	MDHHS
Mounica Nandula	MDHHS
Puneet Vij	MDHHS Toxicologist

Introductions

This scoping meeting was held to discuss the two interim remedial actions (IRAs) planned for the former Wurtsmith Air Force Base (WAFB). These minutes summarize the Team's goal of the IRAs and proposed approach and modeling and remedial design development.

Interim Remedial Action Goal

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are present in groundwater and migrating into Van Etten Lake and Clark's Marsh. The IRA goal is to reduce the areas with the highest concentrations of PFOS and PFOA from entering Van Etten Lake and Clark's Marsh. The goal will be attained by enhancing the existing hydraulic control system at FT002 and expanding the Central Treatment System (CTS) for Van Etten Lake. The system design for Clark's Marsh is scheduled approximately one month after the Van Etten Lake design in terms of sequencing.

IRA Approach

Existing data will be used to design the IRAs. EGLE (Ms. Place) asked about the design parameters for the IRAs. The interim actions focus on addressing the highest concentration areas of PFOS and PFOA entering Clark's Marsh and Van Etten Lake.

The Team discussed the design and the goal to maximize removal/capture of higher PFOS and PFOA concentrations in each area, expanding the existing treatment system infrastructure. The areas to be treated by the IRA's are based on the current groundwater plume configuration and capturing the majority of mass, rather than based on a specific concentration level. The USAF has not defined a specific "high concentration" to be captured. Groundwater modeling scenarios will be run for each area to determine extraction well placement.

Groundwater Modeling and Model Design Boundary

A MODFLOW numerical flow model was developed and has been continuously updated since 1983 for WAFB. The current model was last updated in 2019. The model is composed of three layers simulating the shallow unconfined aquifer. EGLE (Mr. Bradley) asked about the model boundaries and the parameters. The steady-state model is based on empirical operational data from the other treatment systems on-site, including FT002, LF030/031, Arrow Street, Benzene, and Mission Street. The model has been updated to include basal clay elevation data collected during the Site Inspection (SI) and Expanded Site Inspection (ESI) phases. The model incorporates an annual average extraction rate obtained from existing extraction wells. A Figure illustrating the model boundaries was presented to demonstrate the upgradient, downgradient, river, and basal boundaries (see attached slides). EGLE (Ms. Place) asked if the PFOA plume map is the same as the PFOS map. The PFOS background map was used for the 2D figures because the concentrations are generally higher. The high concentration areas are in similar locations.

Van Etten Lake Preliminary IRA Layout/System Highlights

Groundwater modeling for the mass concentrations of PFOS/PFOA at the Ken Ratliff Memorial Park area of Van Etten Lake, using current site-specific hydraulic conductivity data, supports the installation of 11 extraction wells spaced 250 feet (ft) apart. The capture zone would extend for approximately $^1/_2$ mile, which will capture a significant portion of the groundwater plume. EGLE (Ms. Place) pointed out that the extent of the line of extraction wells does not capture the width of the plume to 12 ng/l. The Team reiterated that the IRAs are not designed to be the final solution but to provide a hydraulic barrier to PFOS/PFOA migration. The Team discussed the groundwater model for the Van Etten Lake area, a steady-state model that does not compensate for seasonal changes at the lake level. The groundwater model is used as a tool to evaluate sensitivities and develop a range of operational parameters to achieve the goals. Plume capture will be validated by treatment system performance monitoring, and using adaptive management, the system can be operated efficiently. EGLE/AECOM (Mr. Morse) pointed out the lake elevation changes based on the time of year; therefore, the Team will run two steady-state models, one representing summer and one representing winter, to evaluate potential differences. EGLE (Mr. Bradley) asked about how the capacity of the new GW capture system compares to the capacity of the existing GW capture systems (Arrow and Benzene). The Benzene system flow rate is 100 gpm, the Arrow system 200 gpm, whereas the new system will be 450 gpm. Arrow Street pumping well PW-5, shown on the particle tracking figure, contributes approximately 100 gpm (see attached slides).

Eleven new extraction wells are planned to be installed to depths of approximately 50 ft deep at 250 ft spacing and constructed of stainless-steel wrapped screens. Extraction rates for each well are anticipated to be between 35 and 45 gpm. There will be a satellite control building located on airport property near the center of the extraction well line. Each extraction well will have a discharge line that connects to the control building and a power line. Each well will have a pressure transducer that will allow remote monitoring of the wellfield. EGLE (Mr. Morse) asked if the new system would have any monitoring wells (MWs) installed to monitor the effectiveness of the new system. The system will include wells for that purpose. The Central Treatment System Building will include installing a new 500 gpm treatment system using three 20,000-pound granulated activated carbon vessels. Additional downgradient observation points will be installed as needed to monitor the extraction wellfield influence. The treatment system effluent will be routed to the storm sewer currently used for CTS discharge. The discharge will comply with the substantive requirements document (SRD) requirements for the CTS. Approximately 10 percent of the extracted water will originate from Van Etten Lake, as shown on the particle

tracks extending into the water. Figures demonstrating the modeled particle tracks and treatment system layout were presented. A cross-section illustrating the plume configuration and concentration near the proposed extraction well boundary was also provided (see attached slides). EGLE (Ms. Place) asked to confirm if the new system will be designed to meet cleanup criteria. The system will be designed to meet the SRD requirements as these IRAs are not the final solution; the systems are to provide a hydraulic barrier against the high PFOS/PFOA mass areas.

Clark's Marsh Preliminary Modeling and IRA Layout/System Highlights

Modeling is currently underway for the Clark's Marsh IRA. Preliminary results indicate five new extraction wells should be capable of reducing mass flux discharge into Clark's Marsh. There are seven extraction wells currently in place, along with six infiltration galleries. The FT002 system was brought on-line in 2015. The area north of the existing extraction well system is where the highest PFOS and PFOA concentrations are located (just south of the fire training area). The focus of this IRA is that portion of the FT002 plume entering Clark's Marsh. Figures demonstrating the modeled particle tracks and treatment system layout were presented (see attached slides). EGLE/AECOM (Mr. Morse) questioned the placement and extent of the three new downgradient extraction wells. Could they be extended further? The Team addressed the topography of the area and the need to avoid flood plains and different lithology. EGLE (Ms. Place) asked if new MWs were to be installed. There will be new MWs installed to support the confirmation of plume control and the RI delineation requirement. A cross-section near the extraction well field showing the groundwater plume core concentrations was discussed. The current extraction wells are spaced approximately 250 ft apart. Two new extraction wells will be installed in line with the current extraction well profile to increase capture in the west and in the plume core where the highest concentrations occur. An additional infiltration gallery will also be installed to the west, which creates a mounding effect to reduce this area's flow beyond the infiltration gallery. Three new extraction wells are proposed downgradient to accelerate removing that portion of the plume that has migrated beyond the current extraction wells' capture zone. Although the particle tracks shown extend into the infiltration gallery area, this represents where the particles originate, not necessarily the extraction wells' capture zone. The modeled curved particle tracks for the three downgradient proposed extraction wells result from the topography and groundwater gradient.

The most westerly proposed infiltration gallery component, as shown on slide 17, will not be installed because it is very close to LF027. Model projections estimate a total extraction rate for the 12 existing/new extraction well system at 310 gallons per minute. An additional 20,000-gallon GAC unit will be added to the existing treatment train to serve as a sacrificial vessel similar to the CTS.

Water quality samples (Fe, Mn, TOC, etc.) will be collected from existing extraction wells or MWs to help anticipate current and future influent water quality. Sampling is conducted by local resources as needed; however, AFCEC will notify EGLE of any larger field sampling events.

The plume maps were created using data from the last (most recent) sampling event for the fire training area. Data were also used from the ESI, EGLE data, and other historical data. 3D plume maps are currently in development that will more clearly show the plume configuration vertically. EGLE/AECOM (Mr. Morse) asked if the data set used for the model included EGLE data. Yes, all data available was incorporated into the model. Mr. Morse also asked that a cross-section be shown for Clark's Marsh as was done for Van Etten Lake. A cross-section will be included in the design.

The data used to generate the plumes was collected from multiple sources, including the SI, ESI, EGLE, and data gathered from other investigations. The latest available sampling data point was used for MWs, and vertical aquifer sampling point data were used where available. The vertical distribution of the groundwater plumes is also being evaluated and will be presented in the UFP-QAPP.

Schedule

The schedule presented for the interim Proposed Plans (PP) and interim Records of Decision (ROD) was updated from that issued with the slide deck before the call. Review times must be met to stay on schedule and begin fieldwork in the spring/summer of 2021. The interim PP and ROD schedules were compressed, but the documents are generally smaller, supporting a more expeditious review. EGLE (Mr. Bradley) pointed out the schedule is tight, and there will have to be good communication. All agreed to meet the review schedules. Following EGLE's review of the interim PPs, AFCEC (Mr. Gibson) asked if the next document needed by EGLE is the design, and all agreed another IRA scoping meeting would not be required.

Follow on Topics

The Team discussed the interim PPs' general content and the Air Force's goal to reduce the mass flux of PFOS and PFOA entering Clark's Marsh and Van Etten Lake. Consistent with USEPA guidance on CERCLA Decision Documents, the interim PP discusses only the ARARs applicable to the IRA, which the AF believes are the SRD discharge criteria and spent media characterization and disposal requirements. A complete evaluation of potential ARARs will occur when a final remedial action has been developed. EGLE indicated that they would provide their comments on this issue when they reviewed the draft interim PPs.

Upcoming scoping meetings:

- BCT scoping for DQOs/CSM on October 15th (completed)
- Follow on meeting for DQO/CSM on October 27th
- ARAR discussion on November 4th (if needed)
- BCT scoping for the Risk Assessment (TBD)

Attachments: Slides provided for the October 7, 2020 meeting

IRA Scoping

Former Wurtsmith Air Force Base

10/07/2020

Aerostar SES LLC

AIR FORCE CIVIL ENGINEER CENTER

Agenda

- Interim Remedial Actions Scoping Discussion
  - Goals
  - General Approach
  - Modeling
  - Design Development
- Status
  - Van Etten Lake (CAT605P)
  - Clark's Marsh (FT002)

IRA Goals

- Reduce concentrations of PFOS and PFOA entering Van Etten Lake
  - Design and deploy a hydraulic control system consisting of extraction wells and expanding treatment capacity at the existing Central Treatment System (CTS) to handle additional flow.
- Reduce concentrations of PFOS and PFOA entering Clark's Marsh
  - Expand the capacity of the existing hydraulic control system at FT002 to include additional extraction wells, treatment system upgrades, and infiltration gallery(s) as needed to enhance capture.

IRA Approach

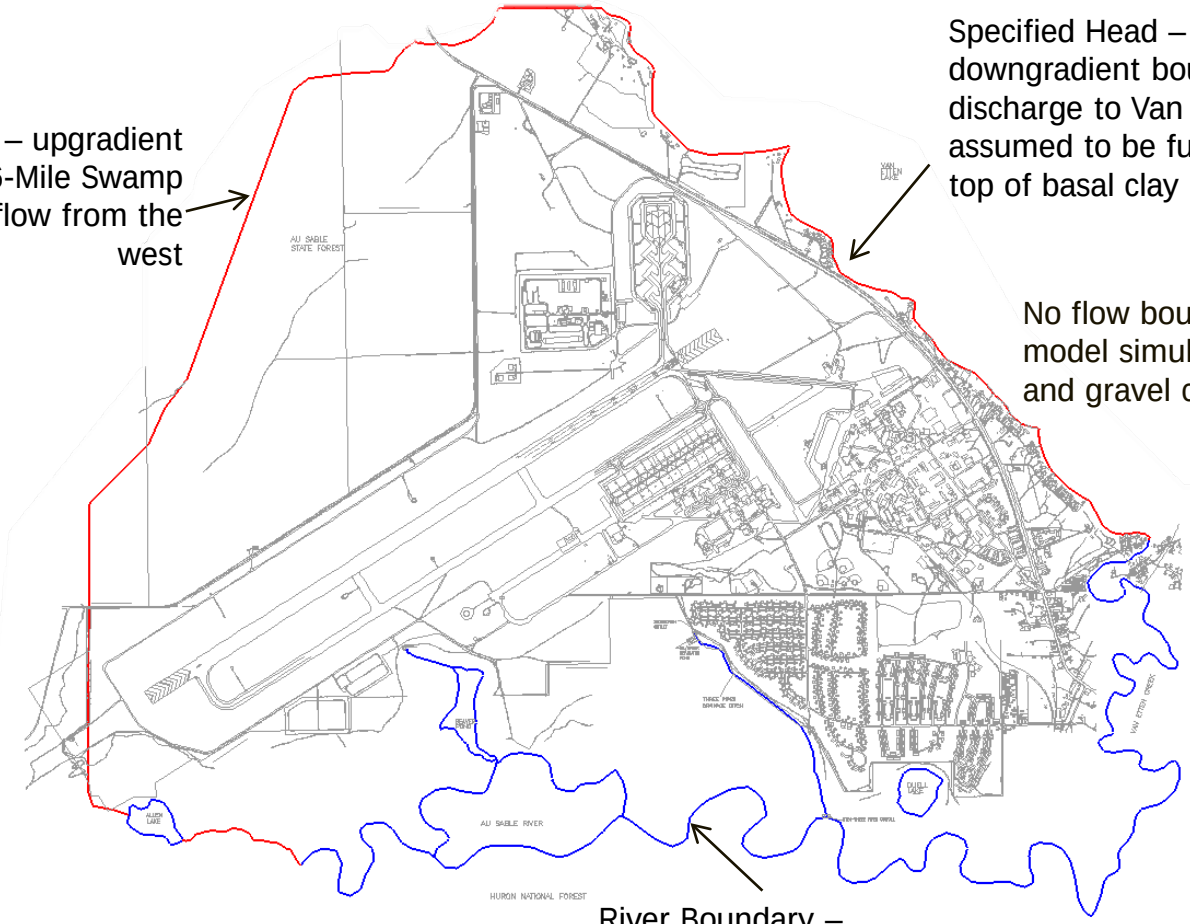
- Review existing data – Identify target capture zones
- Perform modeling scenarios for extraction well placement
- Consider utility corridors back to treatment plants
- Evaluate possible re-injection/infiltration options
- Sample existing wells for parameters that may effect pretreatment requirements (e.g., Fe, Mn, TOC, etc.)
- Comply with treatment system discharge requirements
- Review lessons learned from operation of the CTS and the FT002 treatment systems

Groundwater Modeling

- A MODFLOW numerical flow model has been continuously updated since it was first developed in 1983 by the USGS.
- Recent updates have included model refinement based on calibrations to pump test data completed for FT002, LF030/031, and the Arrow Street, Benzene, and Mission Street treatment systems.
- Basal clay elevation data has been incorporated from recent PFAS investigations.
- The flow model is composed of three layers simulating the shallow unconfined aquifer.

Model Design Boundaries

Specified Head – upgradient boundary at 6-Mile Swamp simulating inflow from the west

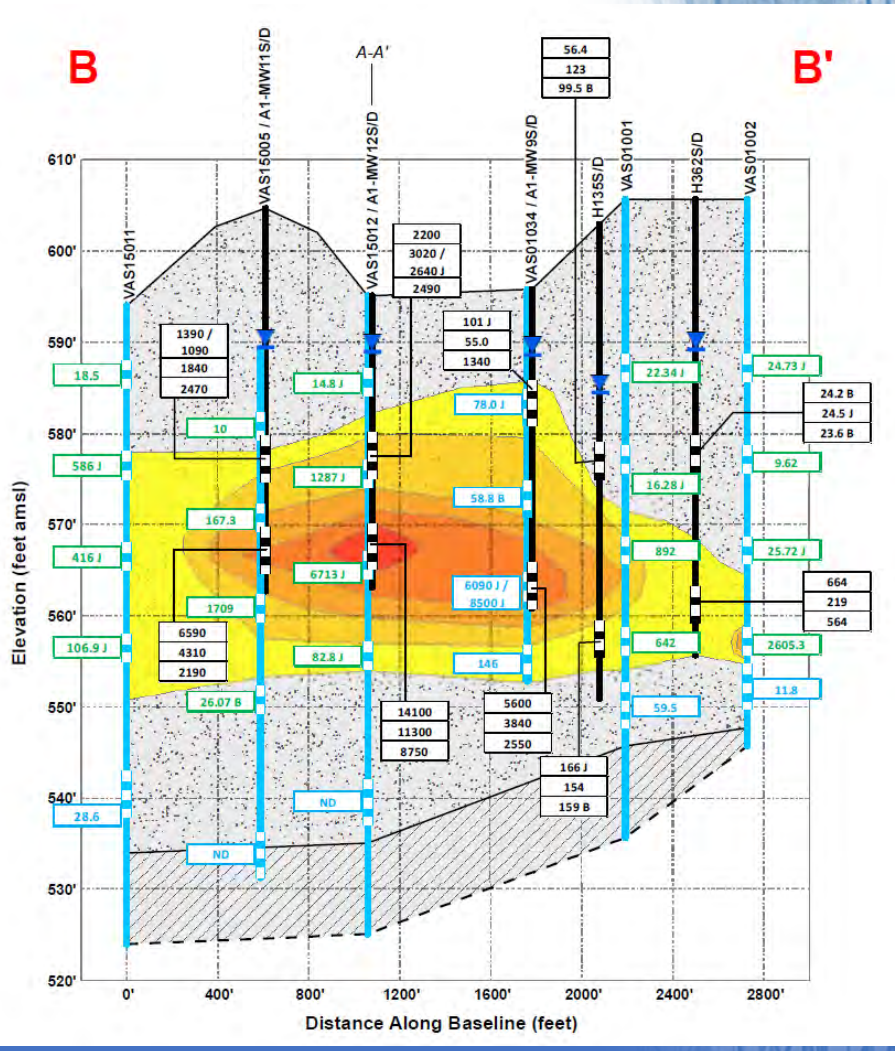


Specified Head – downgradient boundary simulating discharge to Van Etten Lake – assumed to be fully penetrating to top of basal clay

No flow boundary at base of model simulating clay/sand and gravel contact

River Boundary – downgradient boundary simulating discharge to the Au Sable River – assumed to be fully penetrating to basal clay

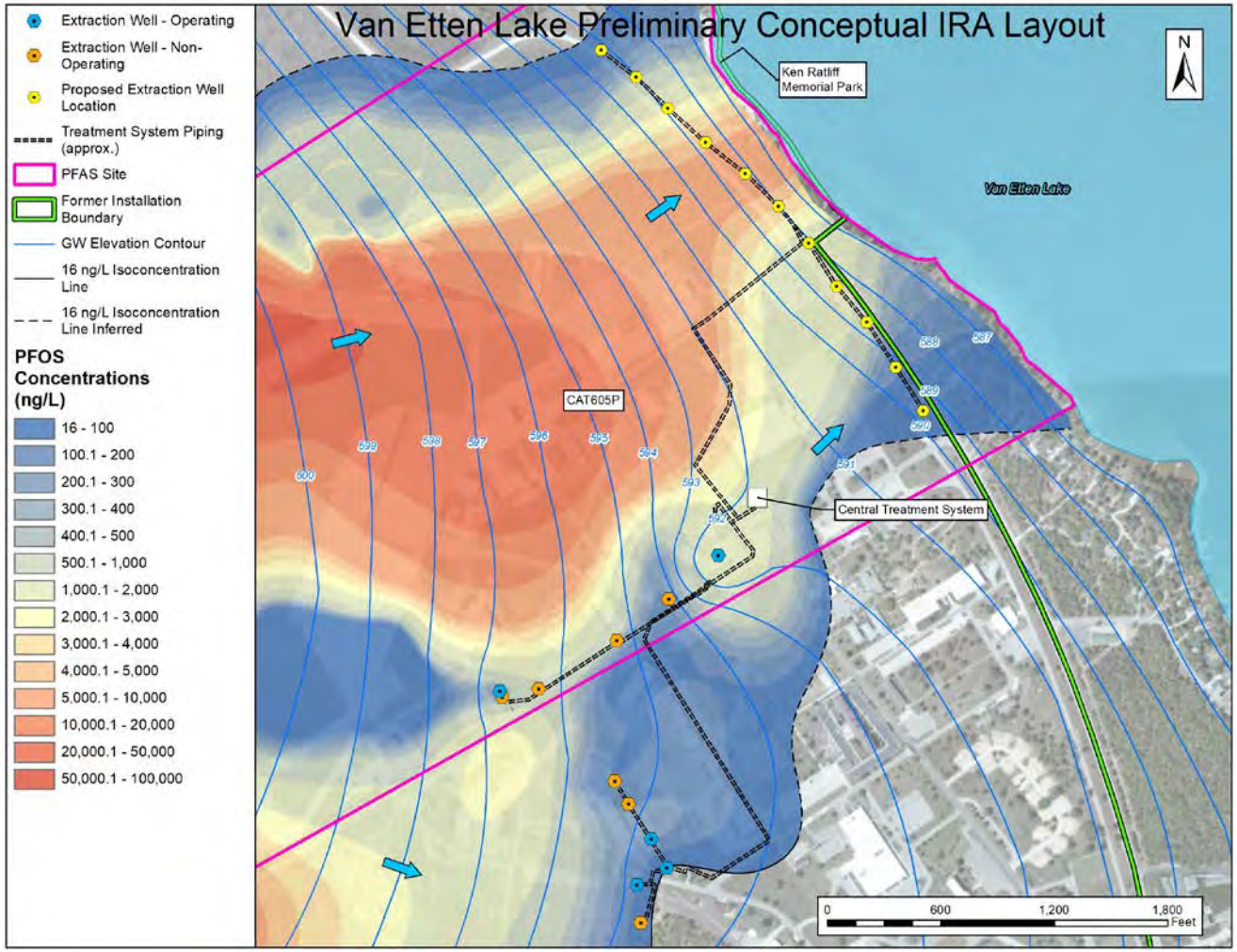
Cross-Section at Van Etten Lake



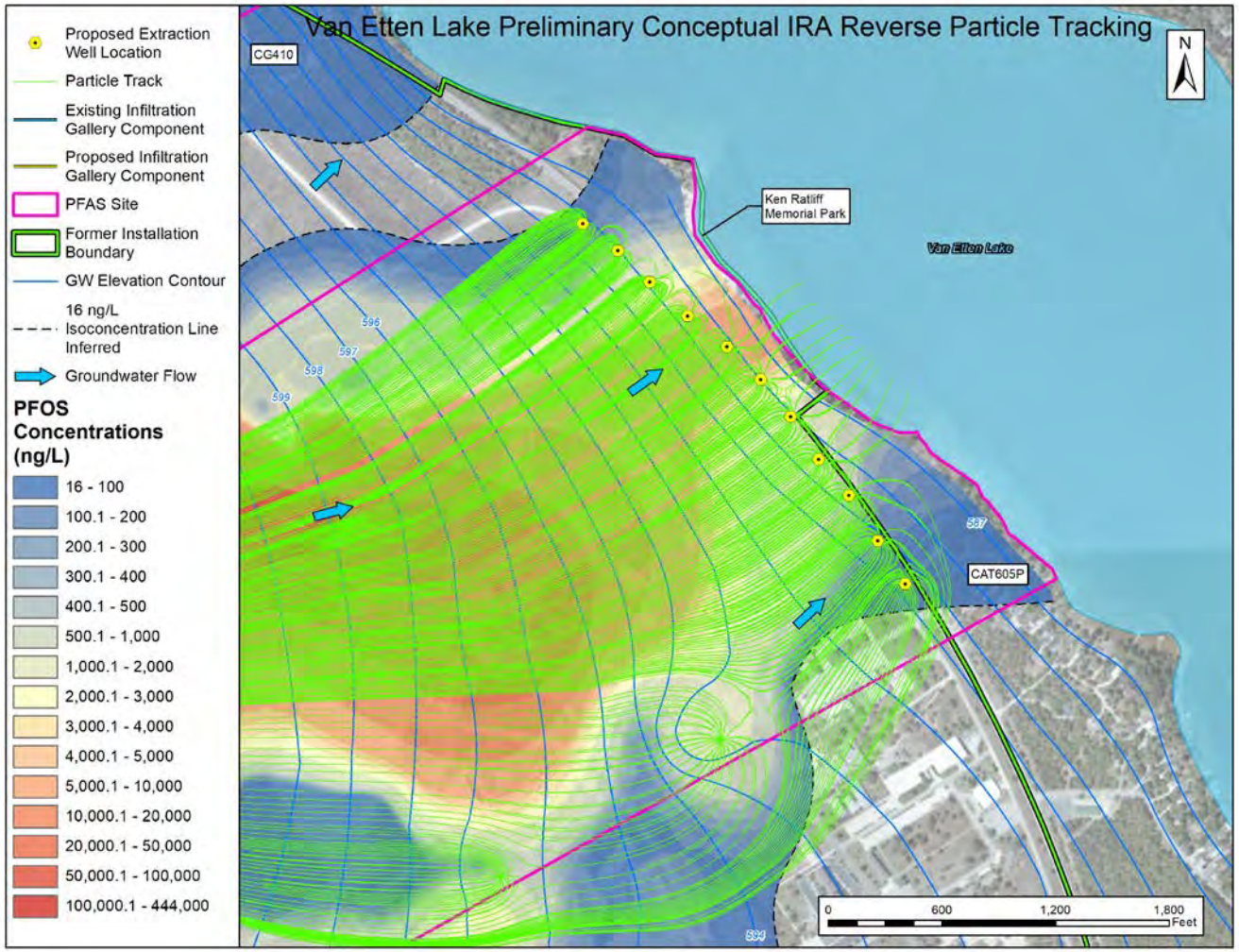
Van Etten Lake Preliminary Modeling Results

- A line of 11 extraction wells (EW) spaced approximately 250 ft apart should be capable of reducing mass flux discharge into Van Etten Lake.
- Current data indicate hydraulic conductivity values (K) are likely to be in the range of 80 ft/day near the lake. However, K values in the range of 120-145 ft/day have been measured in some upgradient locations, so modeling was performed with both values.
- The results project individual well extraction rates between 35-45 gallons per minute (gpm). This would result in a combined pumping rate of between 385 and 495 gpm. 500 gpm will be used as the design basis for the system.
- ~10% of flow into the well field originates from the lake, with the remaining flow coming from points upgradient of the well field.

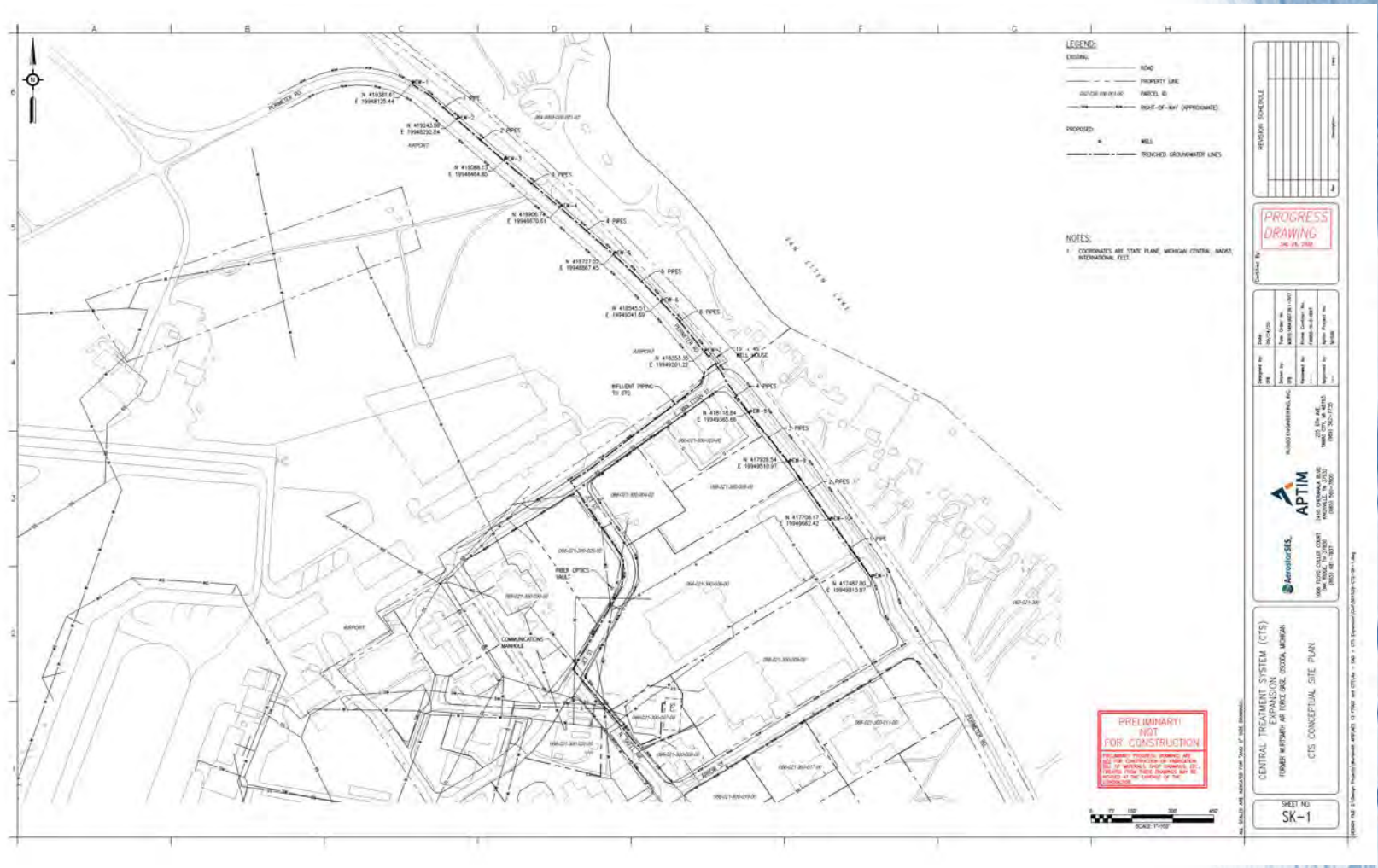
Van Etten Lake Preliminary IRA Layout



Van Etten Lake Preliminary Model Design



Van Etten Lake Preliminary IRA Layout



Van Etten Lake System Highlights

- Well Field
  - Extraction wells will be approximately 50 ft deep and constructed of stainless steel wrapped screens.
  - Power, discharge piping, and controls conduit will run from each well to a new well control building (15‘x 45’) at well field.
  - Control building will house header manifolds, valves, pressure gauges, flow meters, transformer, and satellite control panel.
  - Individual wells will be equipped with 4-20 mA pressure transducers to monitor water levels and use pitless adapters to eliminate need for large vaults.
  - The utility trench running from the control building to the CTS will be an 8-inch trunk line and fiber optic cable to convey water and information to the CTS.
  - Communication between the satellite panel and the main control panel at the CTS will allow remote monitoring and automatic wellfield shutdown should any pre-programmed alarm conditions arise.

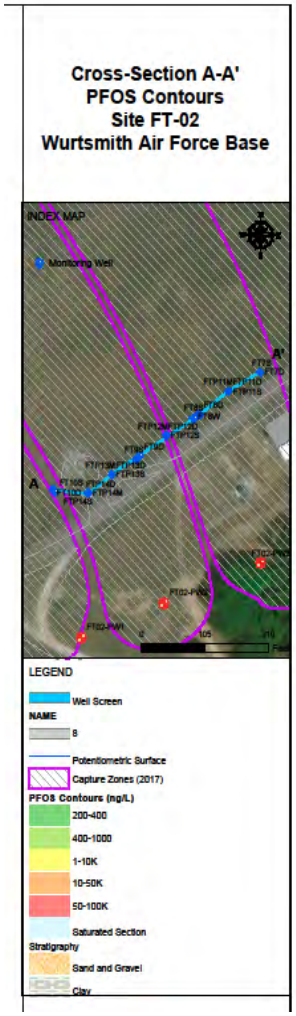
Van Etten Lake System Highlights

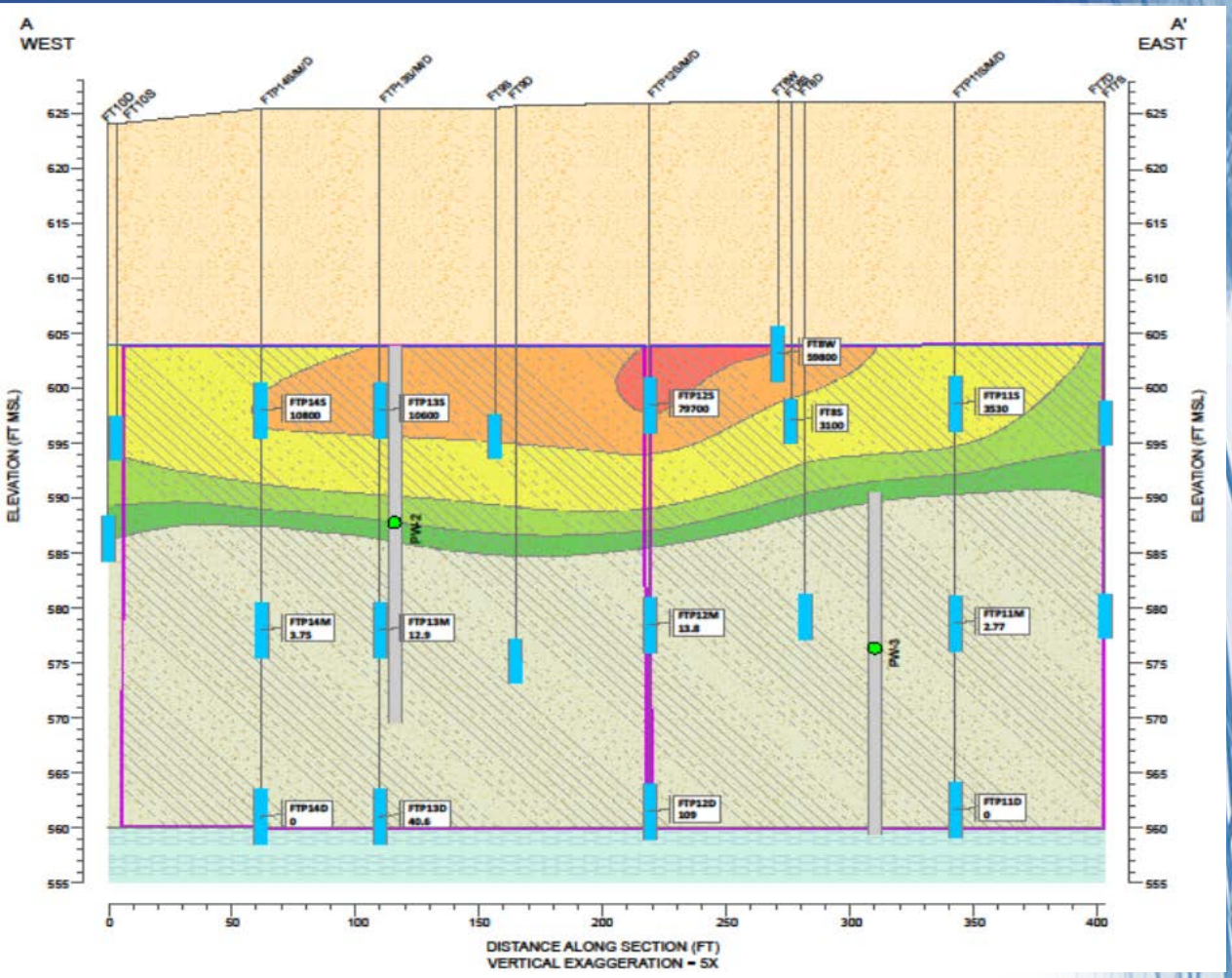
- CTS Building
  - The CTS expansion includes installing a new 500 gpm treatment system using 3 - 20,000 lb GAC vessels (mirrors the existing treatment train for Arrow Street and Benzene well fields). The CTS building and control panel were designed to accommodate the expansion.
  - It is anticipated that a solids separation system utilizing a plate filter press will be added to manage the solids generated during backwashing activities from the existing (Arrow Street and Benzene well fields) and new treatment trains.
  - An addition, the CTS building is planned to provide adequate space for the filter press and associated storage tank(s).
  - Groundwater samples have been collected and analyzed for a wide suite of parameters to help characterize anticipated influent water quality.

Clark's Marsh Preliminary Modeling Results

- Modeling is currently underway
- Preliminary results indicate five new extraction wells should be capable of reducing mass flux discharge into Clark's Marsh.
- Refinement of target flow rate and extraction well screen depths is on-going.

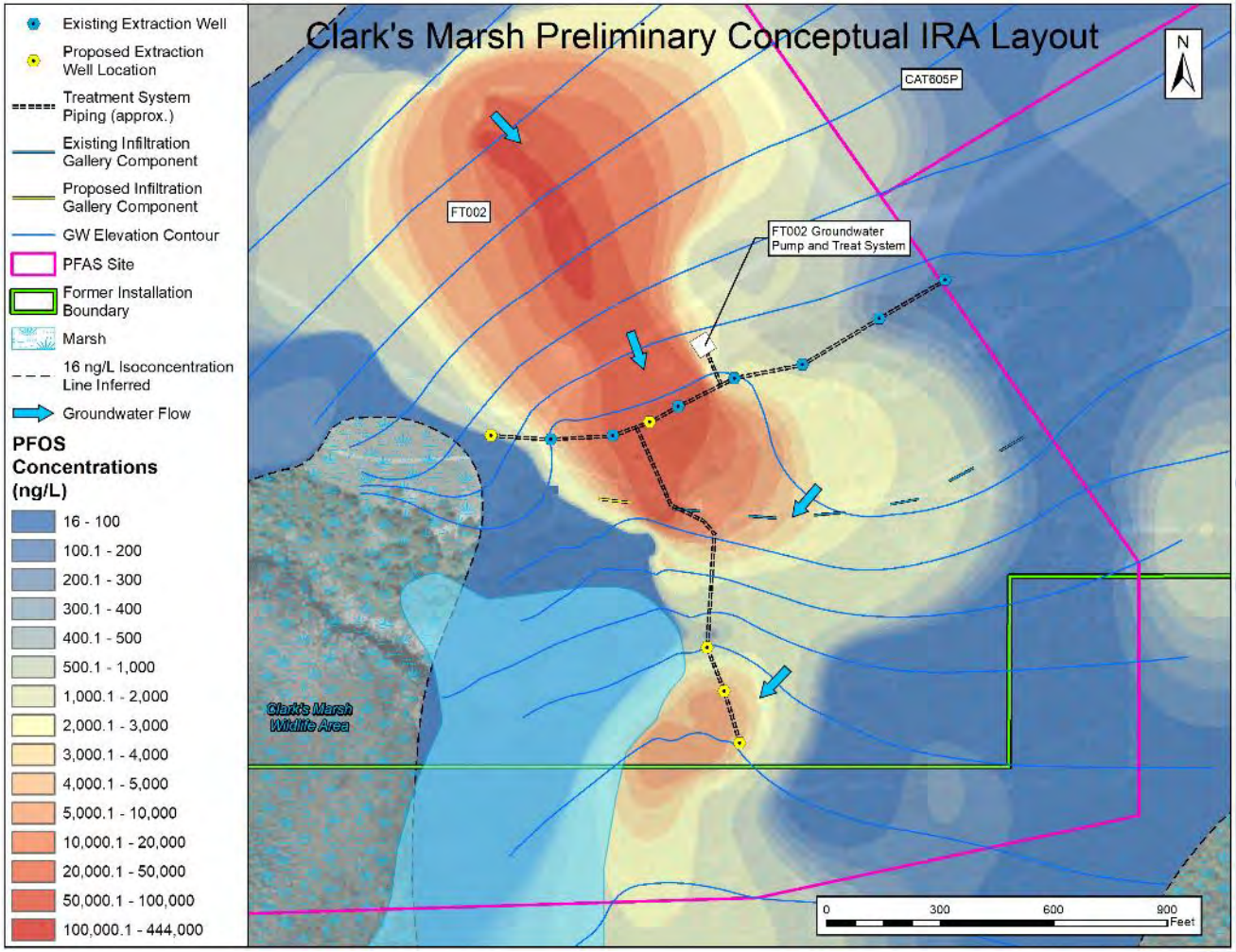
Cross-Section North of Clark's Marsh



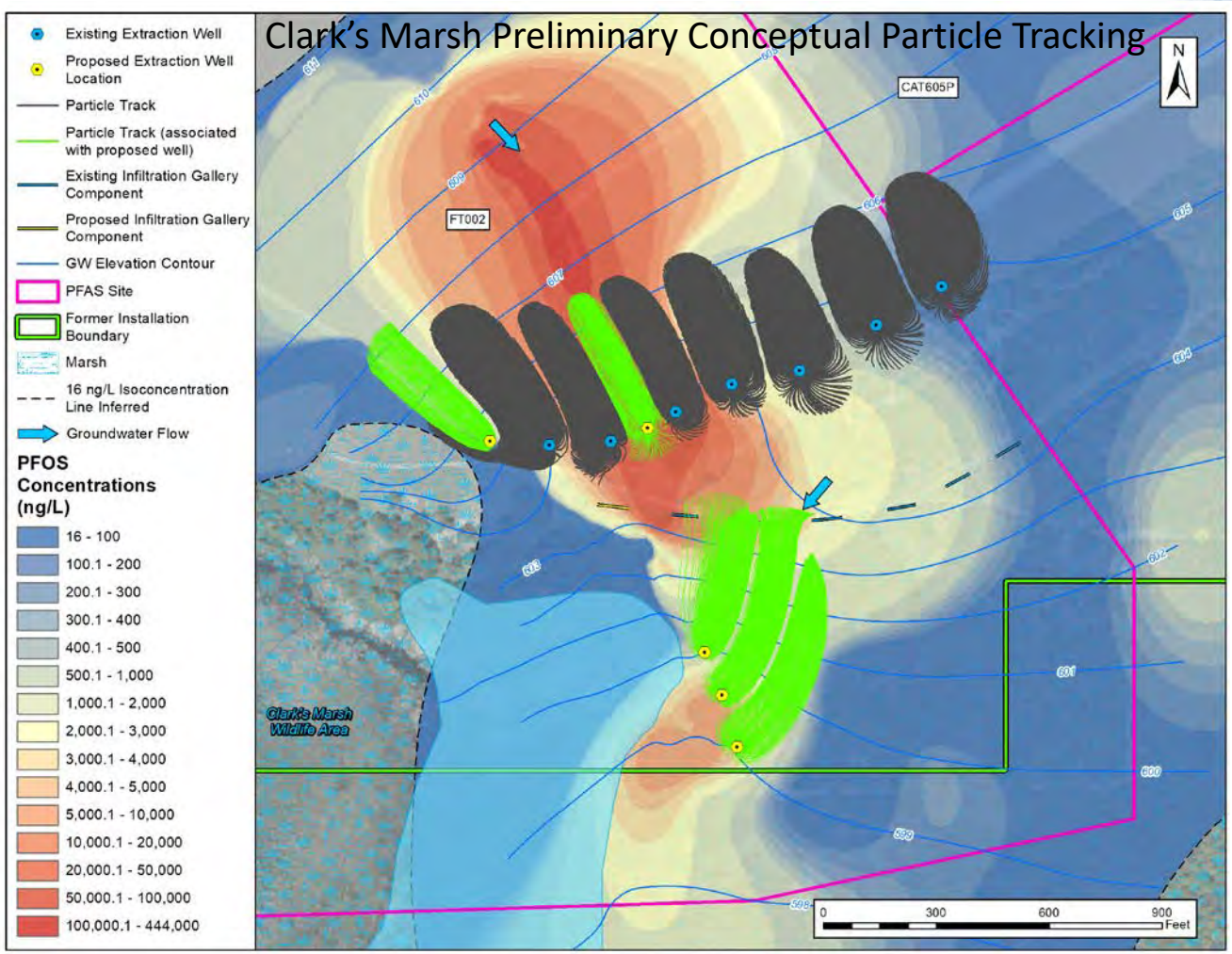


Graphics adapted from Bay West (2018) NGWA Presentation

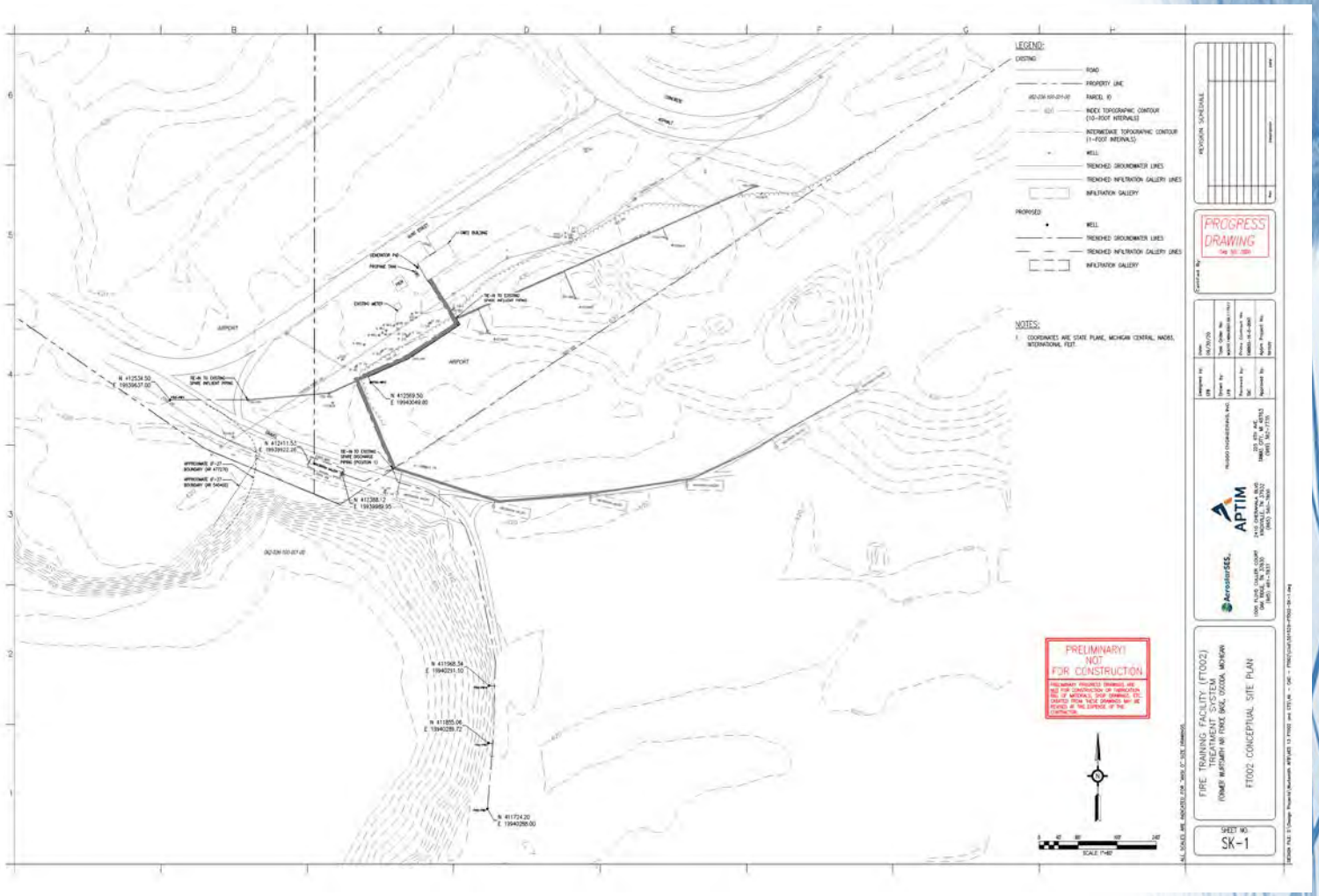
Clark's Marsh Preliminary IRA Layout



Clark's Marsh Preliminary Extraction Well Locations and Capture Zones



Clark's Marsh Preliminary IRA Layout



Clark's Marsh IRA Highlights

- Wellfield
  - Three new EWs located closer to the leading edge of PFOS/PFOA plume with objective of reducing mass flux into Clark's Marsh.
  - Two new EWs located in line with existing well field array. One will be installed between PW2 and PW3 to augment capture within the core of the PFOS/PFOA plume and as a supplement to PW2 which is consistently under pumping target rates due to fouling issues. The second is located to capture the western flank of the plume.
  - One new infiltration gallery will be added to the west of the existing galleries.
  - Model projections estimated total extraction rate for the 12 well system at 310 gpm. Refinement of target flow rate for the system upgrades is on-going.

Clark's Marsh IRA Highlights

- Treatment System Upgrades and Considerations
  - An additional 20,000 gallon GAC unit will be installed to serve as a sacrificial vessel (similar to CTS).
  - In addition to PFAS, historic activities at the fire training area left considerable petroleum mass in the aquifer. The impact of these constiuents on the performance and maintenance of the downgradient FT002 extraction system are being carefully considered.
  - Evaluation of existing data is on-going and water quality samples (e.g., Fe, Mn, TOC, etc.) will be collected from the area to help anticipate both current and future influent water quality. Based on sample results, upgrades including additional pre-treatment will be considered.

Schedule

- Remedial Design

Task Name	Duration	Start	Finish
Remedial Design Van Etten Lake	**130 days**	**Wed 9/16/20**	**Thu 3/18/21**
EGLE Review	30 days	Fri 1/8/21	Thu 2/18/21
Comment Resolution	15 days	Fri 2/19/21	Thu 3/11/21
Issue Construction Drawings	5 days	Fri 3/12/21	Thu 3/18/21
Remedial Design Clark's Marsh	**150 days**	**Wed 9/16/20**	**Thu 4/15/21**
EGLE Review	30 days	Fri 2/5/21	Thu 3/18/21
Comment Resolution	15 days	Fri 3/19/21	Thu 4/8/21
Issue Construction Drawings	5 days	Fri 4/9/21	Thu 4/15/21

Schedule

- Interim Proposed Plans and Records of Decision

Task Name	Duration	Start	Finish
Interim Proposed Plans	**118 days**	**Thu 8/6/20**	**Thu 1/21/21**
EGLE Review	10 days	Thu 11/19/20	Mon 12/7/20
Comment Resolution	10 days	Mon 12/7/20	Mon 12/21/20
Issue Final	1 day	Mon 12/21/20	Mon 12/21/20
Public Comment Period	30 days	Tue 12/22/20	Thu 1/21/21
Public Meeting	1 day	Mon 1/11/21	Tue 1/12/21
Interim Records of Decision	**88 days**	**Tue 12/29/20**	**Thu 4/29/21**
EGLE Review	15 days	Wed 3/24/21	Tue 4/13/21
Comment Resolution	10 days	Wed 4/14/21	Tue 4/27/21
Issue Final	2 days	Wed 4/28/21	Thu 4/29/21

Questions